ACADEMIA NACIONAL DE HISTORIA Y GEOGRAFÍA
1925-2025

DIRECCIÓN DE LITERATURA

LECTURAS DEL CENTENARIO
Número 90

ARGUMENTS IN FAVOUR OF TRAINING: THE RICHNESS OF TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

VOLUME TWO

STEPHEN MURRAY KIERNAN

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THE RICHNESS OF TECHNICAL
AND VOCATIONAL EDUCATION
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Lecturas del Centenario de la
Academia Nacional de
Historia y Geografía/UNAM

NÚMERO 90

Ciudad de México
Junio 2025

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He was editor of an academic journal for Oxford University and a journalist specialising in international affairs for El Economista. He has been an extraordinary professor of Anglo-Irish literature at both the National Autonomous University of Mexico (UNAM) and the Foundation for Mexican Letters. He is a member of Mexico's National Legion of Honour and the National Academy of History and Geography (UNAM).

He is the author of fourteen books whose topics range from the history of theatre in Great Britain to the contemporary importance of technical education in the development of poor countries. He has also published more than 300 articles in newspapers and magazines and edited The Anáhuac Journal for Oxford University. He has organized 220 cultural events over the past 15 years.

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Arguments in Favour of Training
The Richness of Technical and
Vocational Education and Training
VOL. 2

Index

Section 4

Title

Training Among the Neighbours: Can a Successful Training System be Developed between Companies Located in the Same Locality?

Summary

The article focuses on the question: Can you create a successful training system between companies geographically close to each other? The topics are: the possibility of developing a training system within companies (or "intrafirm" training); the positive impact on the performance of training derived from geographical proximity; the nature of the interfirm training group; the role of foreign and multinational companies; and finally the role of training providers.

Key words and phrases

TVET, Technical and Vocational Education and Training, Developing Countries, In-company Training, Training Provision, Training Results, Returns on Training, Training Costs, Training in the Mining industry, Training Evolution, Training Needs and Outcomes, Training Cluster, Training Providers, Training Spillovers, Tacit and Codified Training.

Introduction

A training system may come into existence based on the co-localisation of firms and institutes of vocational and technical learning (Dustmann y Schönberg, 2012). It is not necessarily based on similarities of activity or sectoral focus; however, if they are similar, then the range of skills catered for (or at least those offered at a good level) might be relatively narrow. The

collaboration that may arise works on the basis of information concerning potential partners, ease of conducting business with them, a relationship of mutual trust and understanding, and exchange of reliable practical information (both tacit and codified). Naturally, for some the ideal situation would involve the firm conducting all of its training activities under its own roof, with its own people managing, delivering and assessing; and with no dependence on or interference from outside participants.

However, in reality, in light of limited capability and critical mass, and perhaps to reduce transaction costs, external collaboration might be the best option to identify, access, support, quality-control and perhaps create services and knowledge in this field (for very useful comments on this and related themes, see Stiglitz and Greenwald, 2014). It may also result in advantages of common ownership, incentives and innovation, as well as economies of scale and other cost reductions. Maskell remarked on this point, "... most of the advantages in relation to the skills developed in the local market might be just as big or small for 20 co-localized firms of a given size as for a single firm, 20 times bigger" (Maskell, 2001: 97; there are similar comments made by Galbreath *et al*., 2014).

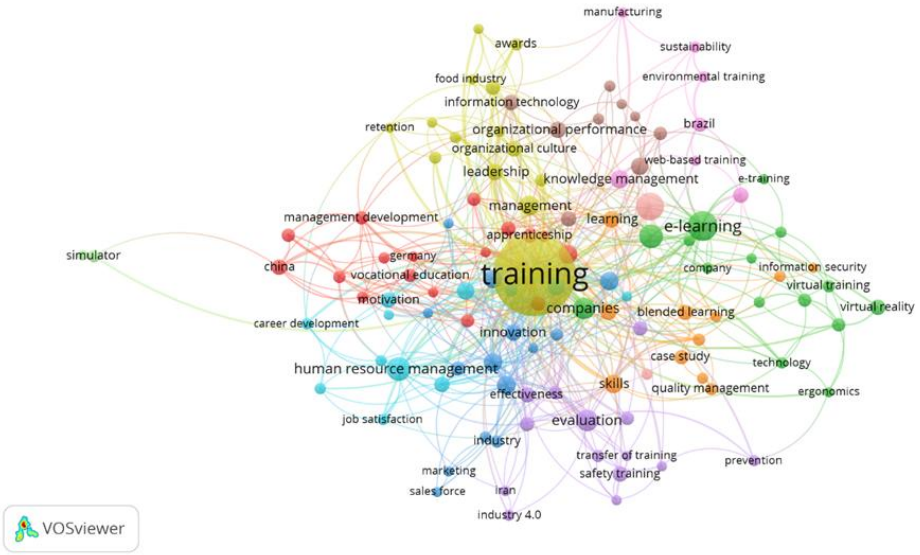
Results and Discussion

How Does an Interfirm or Co-Localised Training System Arise?

The subject of training carried out by, and offered to companies, is global and involves entities of all sizes in all industries and in all places on the planet where humans live and work. Not surprisingly, it is a topic that has resulted in an enormous research output: our bibliometric analysis produced 27,296 results (fig. 4.1). Of course, the research we have undertaken has by necessity imposed geographic and socioeconomic limits, among others. Some of the main concerns associated with this general field of research are virtual training in its different forms, evaluation and effectiveness of training,

human resources management (linked to issues such as job satisfaction and career paths), management development, leadership and organizational culture. Several of these themes are not addressed in this paper as they lie outside our focus of attention.

Fig. 4.1. Training between companies: results of 27,296 documents



The evolution of a local, sectoral or regional training system often originates in particular firms which have identified weaknesses in the competence of employees and skills gaps which bar them from taking advantage of local resources and the equipment and techniques that are available to exploit them. At this juncture, there exist challenges which perhaps for participants who join the system later are not so recalcitrant: vaguely defined trajectories and learning curves, limited economies of scale and experience, constrained financial resources due among other reasons to lack of precedent, and so on. In this sense, Schumpeterian patterns of training system development may occur (Karniouchina, 2013), beginning with high uncertainty and low entry barriers, and the leadership of larger firms (Biais *et al*., 2015), with the increasing participation of smaller firms exploiting opportunity conditions later on (Liedtka *et al*., 2017).

There are bound to be firm-specific, idiosyncratic differences in terms of timeliness, comprehensiveness of utilisation and level of impact with regard to the shared training system evolved in the horizontal dimension among neighbouring firms and firms operating within the same industry, and in the vertical dimension among firms that engage in complementary activities. One may see this, for example, in the form and repercussions that a spillover might have on the horizontal plane compared with its impact on the vertical dimension of the chain. A situation may also exist in which firms with a similar operational focus have very different current skills levels or gaps. After all, the level of participation of a firm that, in terms of capacity building, is relatively immature, depends on its position in what could be termed the skills development lifecycle (similar to comments made by experts such as D'Este *et al*. (2013) about the industry lifecycle).

As the firm matures in terms of its training commitments, there may be an increasing division of labour leading to a demand for additional training capabilities. Again, this will impact on internal provision, whatever an interfirm training system exists, and on other institutions operating locally or regionally in the field. In this case, the firm or firms with the deeper skills and training endowment may have more to give the weaker firm(s) without actually benefiting all that much from the relationship in the process. As a process that involves interfirm openness and probably a voluntary bent, the temptation might be to reduce or cease this interaction precisely because of this asymmetry and perhaps anti-competitive activity. On the other hand, it is quite possible that, all parties being happy with the arrangement, the interaction continues to the extent that greater specialisation and breadth of offer occur.

However, certain firms may consider it unwise to take this step into more specialised skills formation, electing instead to engage in enhancing organisational integration as an antidote to a fragmented group of now-skilled employees lacking a proper system of interdependence and feedback

(Foss *et al*., 2015). Once the process of integration has been completed, the system may have a greater capacity to change or expand into new areas in a timely way that is not detrimental to its structure or existing core training or other competencies. It may also give new specialist providers the opportunity to emerge or for old ones to modify their operations in response to the changing circumstances dictated by what may be a major customer in the local skills development market (Sharma, 2014).

Likewise, the firm may also do this because it has run up against the problem of the absence of competent external capabilities for which a substitution within internal resources does not exist. A very good reason to slow down the evolution of the training system would involve a change of policy away from directed skills formation towards targeting skilled people to perform tasks immediately, in preference to waiting for the duration of a training programme, which may indeed turn out to be a failure in terms of competency needs in the end. Competency-creation is a long-term commitment often without a guarantee of satisfactory results, while the transaction costs and recognised current abilities of a skilled recruit are clear and immediate. On the other hand, should the firm have a well-developed organisation and be confident of its skills-formation trajectory, and if both internal and/or external training capabilities have the required range of competence, then a higher level of specialisation might occur. The general skills level of current and incoming employees, and a reduction in the importance attached to relatively basic, general training, would also be important issues in this respect.

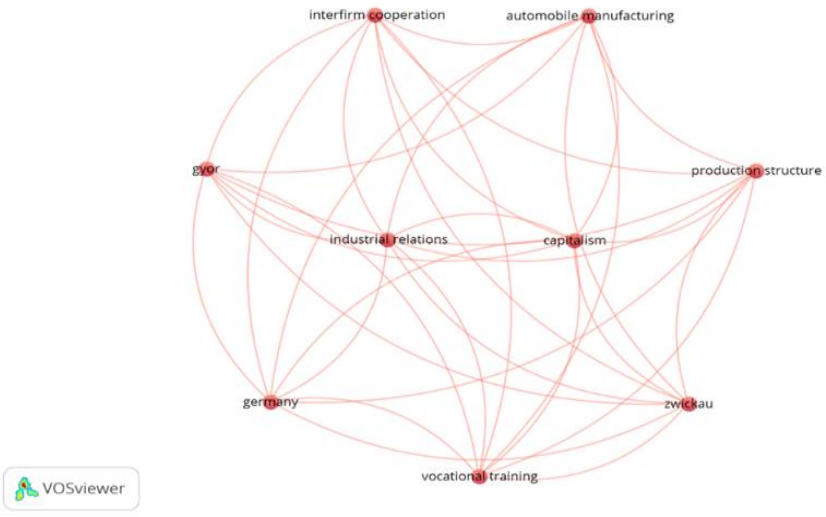
For the training cluster to function well, each firm should analyse how its internal capability is evolving so that the subsequent exchange of training knowledge between firms and other stakeholders can change appropriately over time. This requires long-term discipline, adequate communication capability, and competent people and procedures. Another way to approach this theme is to recognise that, in effect, each firm has an

"absorptive capacity" (Cohen and Levinthal (1989: 569); see also Ashford and Hall (2011)) that relates to its ability to identify, take on and exploit knowledge and skills from both internal and external sources. So, again, while externally the local cluster training inputs and spillovers might be quite frequent and accessible, whether a firm can take advantage of this is a question related to its own personnel, management structure and principal activities. In practical terms, the influence of the cluster organisation itself on intrafirm learning it appears has not yet been well investigated.

Is there a positive impact on training performance derived from geographical proximity?

We did a simple bibliometric analysis of this specific topic of interfirm training. We obtained the following results: that the main concepts (all very generic) connected with vocational training are industrial structure, capitalism, labour relations, production structure and, of course, cooperation between companies.

Fig. 4.2. Interfirm training: results of 21 documents



There may be a stock of skills development knowledge in a particular locality, based on an agglomeration of firms, providers and other related

agents located close together (Halász, 2011). More specific approaches to analysing this theme have been undertaken by Mukhopadhyay *et al*. (2014, on regional networks), Biao *et al*. (2013, on learning regions) and Arif (2012, on collective efficiency studies). They are characterised by their emphasis on joint action by collaborators, based on mutual trust and supporting institutions, leading to competitive advantage. Though it is only mentioned at most as one element in this mix, the collective evolution of a local training system is a significant part of this development. However, some provisos should be mentioned right from the start. The fact that this closeness of agents exists – with similar intrafirm learning mechanisms (Ibrahim *et al*. (2019)), capacity building activities, organisational system and shared needs – does not necessarily mean that the resulting learning pool or system will be accessed (i) if the firm has limited capability to use it, (ii) if it is not what the firm requires, or (iii) if the firm itself has its own resources and internal system with which it is reasonably satisfied.

If like organisational structures, skills are a relatively immobile resource, then the proximity of collaborators and providers, and their capabilities, are central to the development of the training offer to the firm itself (this finds parallels in the immobility of organisational structures as discussed by Breschi and Malerba (2001: 817) and Sheffi (2012)). It is therefore likely that a particular co-localisation of dynamic, reasonably funded and underskilled firms will facilitate a comparatively well-developed cluster of providers and even in-house training departments. Furthermore, as an alternative, it could also be the case that a lot of training can be transmitted in codified form over large geographical distances without interpersonal mediation and interfirm mobility of personnel (Shafaeddin, 2012). After all, upstream firms are often located in a particular place not for reasons of proximity to skills and the institutes which furnish its means of development but because of the natural resources that are found there. This is a situation that contrasts with the one in which a downstream firm is devoted to the production of innovations and is located in a place where essential

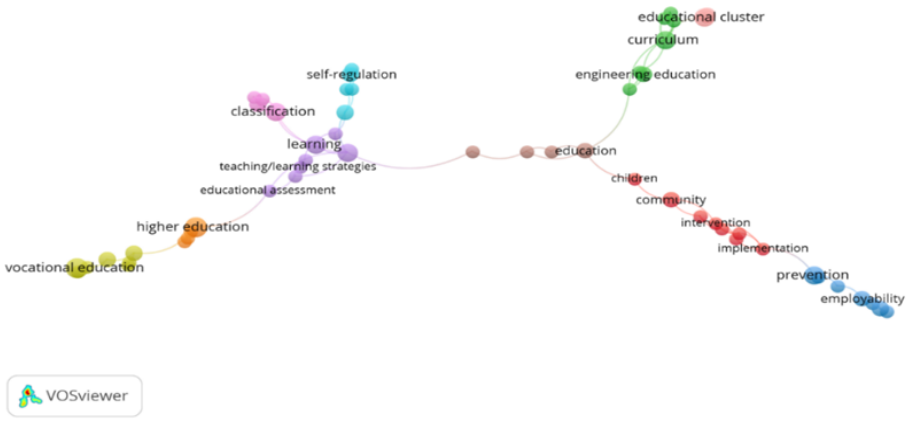
knowledge inputs are available (as described in studies such as that of Tavassoli and Carbonara, 2014).

At another level, what firms learn from each other, in some sort of organised or irregular association resulting in such benefits as an exchange of best practices (for example), may play a key part in the internal learning process involving training emphases and general performance in a given firm. The dynamics for this could be interfirm knowledge exchange and skills catch-up.

What is the nature of the interfirm training cluster?

A cluster in this context is a situation among neighbouring firms of mutual search or support for the provision of training. It is inevitably a very important research field: according to the bibliometric analysis that was carried out, we ended up with 15,216 results (fig. 4.3).

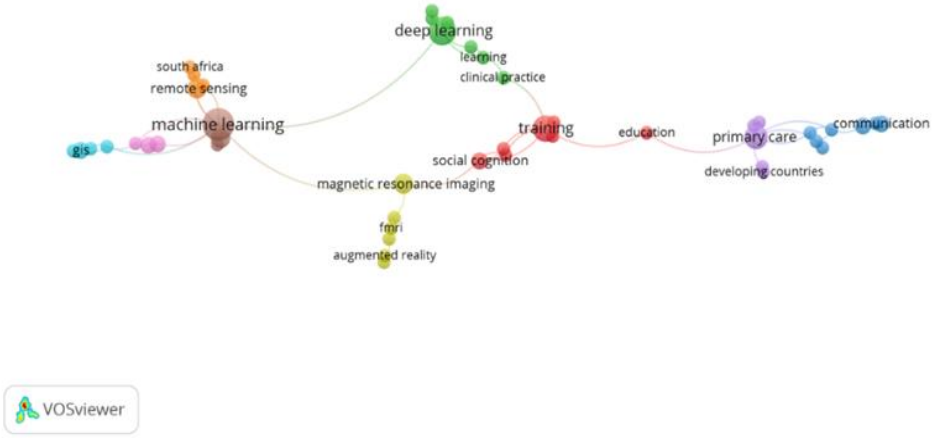
Fig. 4.3. Training cluster: 15,216 document results



The main themes include community, intervention and implementation; employability, educational cluster, curriculum, self-regulation, teaching and learning strategies, and classification. Another search – that of training and proximity – yielded 1,963 results (Fig. 4.4): the most interesting topics in the

context of this current research are social cognition, deep learning and communication.

Fig. 4.4. Training and Proximity: Results of 1,963 documents



A group of firms (of course, even ones from the same industry) and other bodies, operating in the same region, might come together because of the opportunities to innovate the optimum training system among themselves and because of the absence of strong competitive concerns. The commitment or embeddedness of each participant in this endeavour is a reflection of the perceived benefit that they have already experienced or expect, but also the intervention of individuals in the decision-making process favouring participation in the network sometimes in the face of objections. This rests in their belief in the advantages of working together rather than in isolation. Likewise, the firm's ability to use local skills and provision depends on good social links, effective communication, and often active sponsorship. Obviously, the greater the emphasis on "presential" learning – involving classrooms, OTJ, simulators, etc. – and the lesser the use of "distance" training methods, means that the issue of geographical proximity and localisation are fundamental in addressing the training regime created and its development over the course of time.

In summary, once some degree of joint action happens in the geographical or sectoral agglomeration, then firms are open to collective advantages: decisions on training focus and level, "training the trainers", better and more specialised providers, installations and infrastructure, access to information and exchange of experiences, openness to sources outside the cluster, and so on (Sheffi, 2012: 209-236). In an ideal situation, these collective economies managed by joint effort may lead to a "collective efficiency" (Schmitz and Nadvi (1999), Newman *et al*. (2016)) of training knowledge generation and diffusion, and its practical implementation.

In the case of strong inter-firm relations – good examples would be a major firm and supplier/subcontractor firms, or a cluster engaged in interconnected activities within a trade association (Bramoullé *et al*. (2014), Lundvall (2016)) – there certainly could exist an incremental learning process, by example or dictate, to develop the training activities among them, based on the clear understanding that the collective organisation of human capital formation enhances the skills within a shared skills-base and labour market; indeed this is part of the thinking that also sees shared knowledge and norms as working to everyone's benefit (Kapunda, 2017). This can come into being if there already exists a high-trust culture and legal regulation (Shafaeddin, 2012). There might exist a certain level of agreed, formal development of this situation or, what is perhaps harder to appreciate, an informal growth and routinised co-ordination of the shared training system – a phenomenon that could arise, for example, in the absence of a more supportive system in a developing country or a larger agglomeration of firms and providers.

It could be said that the more non-competitive and non-rival the character of the relationship between firms, the better the opportunity of some degree of informal/random or formal/organised participation in the localised training system. However, it would be naive to expect that this will happen inevitably or achieve the best possible results without other

interventions, since such issues as the combination of tacit spillover and geographical distance in the transmission of a training culture, and even the establishment of physically close skills operations may not be sufficient to bring this about (Breschi and Lissoni (2001: 979, 988), Ottaviano (2011), Qian and Acs (2013)). Spatial proximity is important but of equal significance are the interplay of training knowledge codification, labour market weaknesses and strengths, the economics of knowledge transmission (as described for example by Rallet and Torre (2000) and Taylor (2009)), and enterprise strategies that consciously or inadvertently result in a collective participation in the local training system.

The cluster could evolve a selective/adoptive/innovative mechanism that creates the common training system by a process of selection, imitation, variation and monitoring of identified solutions (Maskell (2001: 930), Galbreath *et al*. (2014)). At the same time, this process cannot abandon an individual perspective: the training offer must accord with the self-defined objectives of each enterprise, facilitated or delimited as this may be by a specific institutional endowment. Thus, the activities undertaken by the firms in the group will define what is learnt, while the individual firms themselves will dictate specialised focuses and how these will be learnt (Lundvall, 2016). What prevents inertia from setting in among a group of firms thus engaged in training is their specific in-house exigencies and developments pushing for new training answers – the sometimes "competing visions" that, when well-managed, keep the shared capacity-building project dynamic (Loasby (2001), Piazza (2010)). Another antidote to stagnation is the regular entry of new stakeholders into the network.

The external training environment may well change in a very dynamic way, evolving in response to market forces (e.g., a firm may now want management courses rather than programmes for electricians), government support and strictures, the participation of individual local trainers or agencies of training provision, and so on. Simply put, the situation

may progress from the initial formation of an immature training system, to growth and stabilisation of a more mature system, and end in similar expansion/stability, replacement or decline. The changing patterns of agent dominance and dependency, training market entry/participation/departure, and business volubility will all have a say in this. Depending on capabilities and needs internal to the firm and the interfirm grouping, the "mature" scenario could be one of relative inertness in a configuration involving non-dynamic firm(s) and its agents, limited dynamism between a growing firm(s) and its collaborators, and innovative dynamism in the relationship of a booming firm(s) and its necessarily highly responsive agents (an interpretation partly modelled on Coombs *et al*. (2003: 1131-32) and Baglioni (2018)). In terms of long-term, external ramifications, the last could be seen as the one with the greatest potential to push the range and scale of the training provision. However, the question concerning its efficacy would have to be addressed as there is no guarantee that sheer advancement is a matter of real best practices and benefit maximisation.

The training provision that arises in the context of one single industry dominating a region or cluster is bound to be specialised and therefore limited in scope. This occurs because of demand-led forces dictating what is offered both within firms and outside. On the other hand, if a broader range of industries are present, the provision should have a greater variety. This consideration is no small matter: in terms of capacity building, the influence of a cluster or co-localised firms can be very powerful (as Maskell concludes, clusters are "the territorial configuration most likely to enhance learning processes" (Maskell, 2001: 922)). In this sense, localised learning involving skills enhancement can create an oasis of provision that may or may not enrich the local skills pool and its specific skills gaps. However, it is not clearly efficient to supply a lot of human capital formation (as governments and NGOs have done) in the hope that the commercial and industrial activities of the locality will then inevitably be upskilled and diversify (Draxler, 2014).

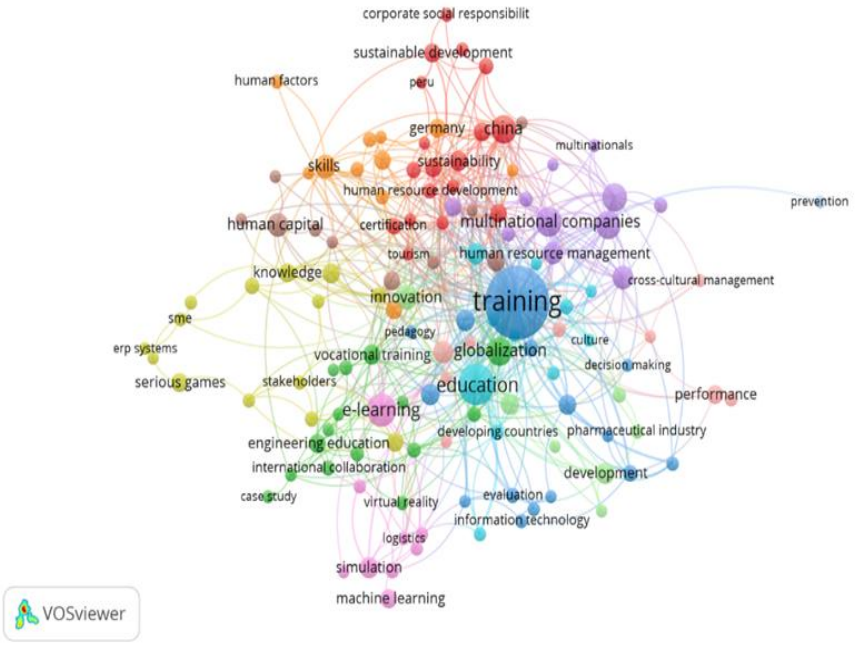
A given cluster of firms engaged in training might be more dynamic if there existed among them a knowledge leader or gatekeeper, certainly by comparison to more haphazardly organised clusters. In effect a situation of reasonably active collective training efficiency could arise, based on structured collaboration that facilitates and stimulates better performance of capacity building

What is the role played by foreign firms and multi-nationals?

Over the years, a large number of multinational companies have developed a culture of training their current staff or new recruits to achieve different efficiencies, stability of standards, harmony and retention of staff, capacity for managed and timely response to change, among other concerns. At best, this will mean they have the openness, if not the active ability, to diagnose what training is required to expand existing operations or launch new ones. In turn, this means that their example of cultural and practical training, whether in-house or secured by imported or local training suppliers, might have a positive effect on the locality or even the region, as long as everything works well.

Through the bibliometric method it was discovered that a large number of publications have dealt with this general field – we arrived at 2,955 results. Topics include: human resource management and intercultural management; certification, sustainability and corporate social responsibility; innovation; various aspects of virtual learning; and of course, globalization and developing countries.

Fig. 4.5. International companies and training: results of 2,955 documents



It has been argued that, since linkages with local companies are often weak, the main impact of foreign firms on their local equivalents in terms of skills competency is achieved through internal human capital formation, enabling its own employees and trainees to operate new machines and participate in modern working practices, and from there indirectly influence other nearby firms (Blomström and Kokko (2003), Makki and Agapi Somwaru (2004), Goedhuys (2007: 287-288)). All this does not deny the possibility that at least an improved training regime may appear locally at least partly as a result of the close presence of a developed training system within a large and dynamic firm. No firm is totally self-sufficient when it comes to the creation of a training regime and its subsequent operation and evolution: interaction and collaboration take place with stakeholders ranging from trainers and government inspectors to local community leaders (Edquist (2006), Lundvall (2016)). There is also no denying the strong influence a firm (whether foreign or otherwise) might have on its suppliers and subcontractors (Javorcik (2004), Malik (2015b)), in terms of its role as a

model of the benefits of a solid training culture and skills-level expectations of its partners.

Similarly, there also exists the question of a skills development spillover between the foreign firm and its local neighbours, with some authors arguing that there seems to be little evidence that it occurs effectively, particularly if the gaps in organisational sophistication, processes, institutional policy and technological advance are considerable. A spillover could be expected to be easier if these gaps were closer. In this regard, it is part of the brief of this study to see if certain authors are correct to argue that there seems to be little evidence that this occurs effectively (Buch *et al*. (2014), Chen *et al*. (2015)).

The provision of training may be path-dependent (Sood *et al*., 2012) if the firm is a subsidiary of a block of enterprises (e.g., part of a multinational) and is thus endowed with a ready-made and previously proven system; if the local context has a reasonably well-developed training provision and much use is made of it; or if the internal training system is established with relatively set ideas concerning how provision should be created. But neither Sood nor Malerba (2002) discuss sufficiently how certain firms and indeed sectors may be quite rigid in this regard (as a reflection of such considerations as the high costs and risks involved as well as training habituation), while others, particularly "evolving" sectors, may be more open to innovation and trial-and-error experimentation. Of course, a major factor behind the evolving nature of the training provision is the firm-wide dynamism of innovation that is permitted to take place (these remarks were developed from some conclusions made by Coombs *et al*. (2003: 1126) and Baglioni and Sinclair (2018)). In short, how the training is developed is a question of the given conditions and the challenges they present, the capabilities (of funds, analytical capacity, personnel, structure, confidence in training, etc.) inherent within the firm, the competence of and relationship

between the participating agents (e.g., whether this is co-ordinated or competitive), and the regularly assessed success or failure of the endeavour.

A parent firm might find that a subsidiary has enacted successful training processes and routines: in effect, the smaller company has been a laboratory for experiments in human formation, on a scale that is definable, enlargeable and reasonably credible. However, replication might not be so easy to achieve. Not alone is it hard to put even single operations and discrete pieces of knowledge on paper in a codified way, but the parent company often fails to replicate successful experiments, not taking sufficient account of the importance of organisational knowledge and structure (Szulanski and Winter, 2002: 62-63).

In the context of this study, the participation of multinational corporations in making localised decisions (possibly over the heads of local management and training coordinators) is an important issue. One should keep in mind that inward FDI is responsible for a very sizable part of gross fixed capital formation in the LDCs and in all Developing Countries; and, as such, has a very strong influence on all types of learning and capability accumulation. In one sense, the perspective at the multinational level might lead to the firm to view collaboration with other firms as a breach of self-interested policy, while at the local level, the view might be that there are few competitive reasons against collaborating in this as in other areas and many others in favour. This develops arguments presented by Breschi and Malerba (2001: 822). The top-down intervention might then be classed as underinformed and biased. Of course, the practices involved in globalisation can support and reinforce local ways of doing things, just as the activities and knowledge originating in and tested at the local level may feedback very positively into the “globalised” training knowledge pool, facilitated as it may be by very direct communication links as exist in a multinational enterprise (Breschi and Malerba speak along these lines, as do Wheelahan and Moodie (2016)).

Studies have been done that support the argument that foreign firms have stronger vertical links with other enterprises, and that they tend to invest more in human and physical capital (e.g., Goedhuys, 2007: 281). Local firms tend to substitute in-house alternatives and have less formal connectivity with other local firms (Newman *et al*. (2016)). The reason for the higher prevalence of training among foreign companies can be explained by the transfer of equipment and working practices (and its demands on skills) from the parent company, the existence of manuals and other sources of information, the institutional training policy; and the availability of a training culture, transferable and adaptable system, funds and highly mobile training personnel. The question in this context relates to the possible higher provision and quality of the training offer among foreign firms, versus the perhaps better training fit that a firm can achieve through being more locally embedded.

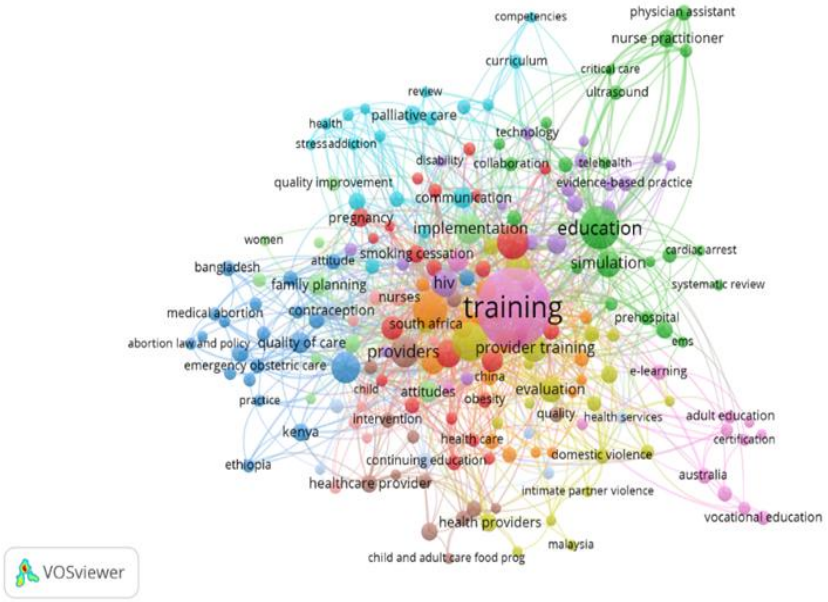
Of course, bereft of a sense of local loyalty and adequate local knowledge, a foreign firm might coldly calculate that expatriate labour complies with its pressing needs. However, the presence of skilled workers imported from outside and the desire to have new colleagues raised to their level in an effort to reduce productive and HR weaknesses due to lack of uniformity in capability, might be a supportive factor in skills development. Not to mention the corporate policy demanding a uniform high-skills level, quality production and focus on comparatively more exigent foreign markets.

What is the role of training providers?

Naturally, it is not possible to address the general topic of this research without talking about training providers. The number of publications on this topic confirms its importance (this research found 24,617), and there is also a great abundance of sub-topics related to the role of providers from different locations, training approach, levels of competence, teaching practices and evaluation, types of clients and of students/trainees/graduates, and so on.

Again, it should be mentioned that a large part of the results of the bibliometric analysis is not directly related to the topics on which this study focuses; however, it does show the magnitude of interest in this field. Then, among the results, the elements that seem to be of greatest interest in the context of this work are simulation, evidence-based practice, competencies and curriculum, collaboration, implementation, review, quality improvement, attitudes, training for providers, quality and evaluation, and adult education.

Fig. 4.6. Training providers: results from 24,617 documents



If the training regime is characterised by a high level of training demand and opportunity (such as would exist when a new mine is opened, for instance), it could be expected that new providers will appear, perhaps of untested competence and offering services not suited to the new consumers. A given level of instability would result if such factors as firm-level training leadership, clear communication of service needs, and provider quality assurance (imposed by customer-firms or by some government authority, for example) were not also in place. The firm or group of firms could help remedy this situation by market forces (as buyers they choose who gets their

custom) or perhaps by direct intervention (e.g., advisory input for the provider).

The key element afterwards in the long term is persistence in this feedback or intervention, as providers will tend to be relatively passive if training knowledge input and formation path management through demand-pull forces are not very active. A contrary situation is one in which the firm or group of firms create their own in-house provision, independent of outside institutes (though sometimes with their participation); or decide to cancel or reduce their activities with external providers and resort to the type of in-company skills development that furnishes them with more control of their vocational and technical training (Arif, 2012). Yet another scenario embraces the possibility that a large firm or a group decide to establish a more or less autonomous institute that is directly and collectively funded and managed by them, perhaps with some involvement by a government ministry, semi-state organisation or NGO.

Let us look briefly at the competence of the providers themselves, without getting involved at this juncture in their particular public or private character. Some will be experienced in the field of the firm; others will be experienced in other fields and perhaps, because of this base, are ready to make the transition to respond to the requirements of their new customers; and lastly others will be experienced in a wholly unrelated field and unwilling or incapable of making the transition, or the transition once made, are poorly prepared. Newly created training providers comprise yet another category and these should carry out their surveys and target their capabilities. One important point to be made about both established and new providers is that they may have to co-locate situated in sometimes very challenging places (e.g., mining firms). The absence of basic systemic elements (such as an existing infrastructure), combined with company guidance if not also active support, should inspire them to be innovative. This is a theme that needs to be better investigated in terms of location studies and agglomeration effects.

The emergence of more numerous providers, many of whom could be expected to be specialised and of higher relative quality than before, should make for wider provision that is easier to access, possibly enabling a more secure training investment and development path, and incrementally improved training/learning trajectory – there is even the chance that prices would go down (Caniels and Romijn (2003:1266), Van Long *et al*. (2014)). The specialisation that could emerge could be due to two factors. The first is obvious: employees have basic skills and now require intermediate and advanced training that is by definition more specialised. The other factor relates to firm-level idiosyncrasies: the training that corresponds to a particular enterprise may be, for that very reason, firm-specific, addressing core competences and their associated skills and routines (Leahy (2012) looks at this in terms of a firm's competitive capacities and sustainable advantage). There is no reason not to suppose that, given enough training market volume and continuity, and a lack of firm-level provision, that a cluster of training providers would not come into existence to form a collective, preferred option for the firm cluster. However, this would depend on local business culture, a sense of comfort in group linkages, and the discipline not to give in too readily to temptation and disintegrate the training group. The momentum for this could come from a dominant firm or the cluster itself, or a government agency recognising the scale advantages and perhaps the benefits to public agents participating in the provider group.

The habit has already been formed in industry in general over the last few decades of outsourcing productive activities to reliable outside contractors (Bell, 2007: 37). For reasons now of history and satisfaction with this generic activity, a firm might be emboldened to do the same when it comes to training. Likewise, smaller firms with currently limited in-house capabilities and without plans to change this in the near future, may also contract outside providers. Their inability to design and project manage a training system, coinciding with a clear present need to develop core competences that resolve current weaknesses and facilitate effective business

partnering with other firms of a higher skills level, makes this a good alternative. The downsizing of public provision in certain regions, and the ineptness of much of the rest, could also help in the growth of private provision led to some extent by related outsourcing.

Conclusion

In the particular case of this study, the reason why a firm is located in a particular place might not be due primarily to the availability of training provision, skilled labour or other "knowledge externalities" (as might be the case of a business park beside a university), but to the location of natural resources (Michaels *et al.*, 2012). Under these circumstances, the place where the firms locate may in fact be populated by at best semi-skilled workers and devoid of training or educational services, and so such matters as the quantifiable effect of training and local spillovers could stand out very clearly in what is in formal knowledge terms virgin territory.

In a situation in which a firm is literally on its own, its geographical position dictated by the location of the natural resources it wishes to extract, it is therefore not capable of entering the same localised training system that springs up among clustered firms and providers, and as such it is left to its own devices. In response to its physical and systemic isolation, the lack of external alternatives, time limitations, and so on, it would appear to have three options, namely: import staff from outside the locality; establish its own in-company, or company-sponsored outsourced, training system; or of course a combination of both: e.g., import instructors and training packages to install an instantaneous in-company operation. A further option is to arrange for selected personnel to travel to reliable providers, but this may be problematic in terms of expense and disruption to labour and productive routines.

It has been argued that local networks endure for relatively long periods of time (Calvó-Armengol and Martí Beltran (2009)), can be very active and well-coordinated, meet the challenge of relatively costly provision by pooling resources, share programme and assessment design, shoulder the risk in training innovations, support continuity of demand, and facilitate interfirm labour mobility and the formal/informal spreading of ideas and technologies (changes in attitude and motivation, application of better performing knowledge and skills, etc.) (Bernstein and Winter, 2012). In the case where the training objective has priority, another very positive consequence is the consolidation of trust and reciprocity through these training interactions. All of this can occur efficiently if competitive imperatives are not so strong, and knowledge and staff (often one and the same of course) retention are not of paramount concern.

Among the firms that make up a cluster, some may be training-dormant, others more training-emulative or even training-innovative, so ideally their coming-together should be productive. However, some will thus be training leaders while others will be pulled by the capacity-building system, though the effect of all this would depend on the connectedness/embeddedness, and the relative size and training volume, of the firms within the local training system. If we just look at individual agents and their role in distinct areas of the training activity and its dynamic evolution, we might be failing to credit some of these same agents as systems anchors, integrators and gatekeepers; and to analyse how this occurs and for what reasons – indeed, why these specific agents do what they do and not others.

Likewise, if an effort is made to measure the inputs/outputs of a local training system as a group (e.g., in an attempt to clarify averages), this might be unrepresentative of the more dynamic firms, and the timescales and investments they have made to reach their current positions (Van Long *et al*., 2014). At the other end of the scale, there is a danger for firms which take

more from the training system than they give in: it might be argued that the greater the emphasis or dependence on external sources of training knowledge and provision, the lesser the relevance it might have to internal needs, if there is not sufficient input or adaptation of the input, or if selection of training inputs has not been done in the first place with sufficient care based on clear criteria.

It is quite possible that the training strategy managed by a given firm will be affected by the prevailing dynamics of the other enterprises and institutions in the local training system. This interfirm coordination will inevitably be buffeted by different emphases and appreciations specific to each agent, and perhaps work against the firm's own concerns. This will be a stronger consideration if the firm depends on the group system, less so if it is more self-sufficient in terms of training capabilities that are internal to it. Even so, decisions arrived at collectively may involve the lowest common denominator and result in a failure to achieve the sort of best option that can only be secured through a group structure and shared resources (Riley and Young, 2007).

The role of government as a reliable source of training models, and of the identification of specific elements that make these models successful, can be very important. The same could be achieved by an interfirm or sectoral association, or by internal corporate mechanisms. But often this is considered the government's role, for which levies and other contributions have been made (Diego *et al*., 2017). The key actions subsequently relate to how well this is articulated; how much support there is to start and sustain the developments required; and how capable and indeed confident each particular firm feels to recognise elements that work, jettison or adapt those that do not, and innovate or introduce new ones. A recent phenomenon is the situation in which a relatively dominant firm or group of firms have converged their training objectives and used this to leverage greater support from the government, especially in terms of the establishment of

qualifications and standards bodies, and improved services from both public and private providers (Education International, 2011).

One challenge for the development of training in poorer countries is the fact that responsibility for managing this system is often dispersed among sectoral line ministries, which – in the context of their organisational, legislative and financial clout, as well as their frequent underperformance and rivalries – may dilute the positive impact of a major player or cluster system. Their competence to interact helpfully with leader-firm and interfirm activities, donors and even intergovernment projects is often not as good as it could be. However, the establishment of skills bodies and standards/qualifications systems of a credible international level is a good advance and supportive of in-company capacity-building ambitions (Lundvall, 2016).

Section 5

Title

The Know-How and the Know-What: The Compatibility of Tacit and Codified Training Knowledge in Creating a Functioning Training Regime at the Firm and Interfirm Levels

Summary

The article considers the question if there exists compatible tacit and codified knowledge of training, that work together in the creation of a regime of functional training at all levels within the company (intrafirm) and between firms (interfirm). It addresses the difference between teaching and learning. Following this, there are two major focuses that are considered: the characteristics and performance of tacit training knowledge and of coded training knowledge.

Key words and phrases

TVET, Technical and Vocational Education and Training, In-company Training, Training Provision, Training Results, Returns on Training, Training Costs, Training Needs, Training and Division of Labour, Training and Employment, Training Cluster, Developing Countries, Training Spillovers, Tacit and Codified Training.

Introduction

When an input of tacit or codified knowledge happens, it is often impossible to predict with certainty what effect it will have, in terms of such phenomena as improving the quality of the work undertaken or efficiency level. What is the elusive “fixed quotient” of learning, to use an apt phrase, that arises from

a given number of "units" of invention? (Bell, 2007: 6.) If the firm has some of its own "training memory", or is well advised or has investigated precedent projects, then there should be some confidence as to what the effect will be. However, the temptation might be to regard more or less faddishly any capacity building as useful in developing "knowledge assets" (human capital), therefore producing a relatively random result that is not properly derived from relevant information, and that proceeds in a way that is not competently designed and engineered for the fullest personal and firm-level benefit (Strang and Macy, 2001).

Tacit training is normally a matter of "know-how" rather than the "know-what" of codified training knowledge: the first is procedural knowledge, the second involves declarative propositions (this description is derived from related remarks made by Hass and Hansen (2007) and Lundvall (2016)). At the same time, a firm should have answers to the following questions underpinning its capacity-building project: why it is training, what it is training, how it will carry out this task, who is training and for whom, and what the objectives and benefits should be (adapted from Johnson *et al*. (2002), Klagge and Peter (2012)). As such, training should ideally aim to share information, facilitate its interpretation, create and protect routines, and establish viable and practical networks.

Results and Discussion

Teaching vs. Learning

An optimum balance needs to be reached between learning style (relating to the intelligence, instruction capacity and behaviour of the trainee, among other factors) and teaching style. A learner arrives with a certain level of education/skills and a certain capacity to be trained. Given the level of literacy among low-skilled trainees, for instance, the most useful training methods could involve audiovisual and visual tools and direct demonstration.

Likewise, there might be advantages in enabling learners to reflect on how they learn ("learning to learn") so that they enter more fully into the training experience. There is new thinking of course about how training could be learner-centred but in reality many situations do not furnish the persuaded individuals or the capacity to accommodate this properly. The basic structure of the learning process can be explained in the following way:

- ►Training by instructors
- ►Training of learners
- ►Use of learning materials, tools/equipment, facilities
- ►Training organisational inputs: administration, finance, promotion, content design, assessment procedures, certification, internal and external collaborations, etc.
- ►Inputs from company (local and network), parents/families, authorities, etc.

One of the first issues concerning the style of training that is offered has to do with the skills knowledge of the trainer and his instructional ability, and the completeness of the skills (basic or otherwise) formation system that is in place to support this. The latter addresses the existence and applicability of the enabling tools that support training: equipment, guidance on instructional methods, curriculum, programme plan, assessment practices, and so on.

Now, some brief words about the trainer. The unskilled and semi-skilled young will often avail of the informal apprenticeship offer that involves learning in an observational and gradually participatory way with a mastercraftsman (MC). More formal pre-employment or apprenticeship training may also be an option. If the skills level and participation of the MC or trainer is high, or if his abilities can be upgraded and his enthusiasm and discipline fortified, so much the better. An MC may have the trade skills but his weakness could be in his management of training activities and of what

is learned in each session (in a way that approximates to a modular structure). His ability to communicate both knowledge and its application may also be wanting.

At the same time, those with a low skills base will not learn so well when the starting level is too high (complicated language, techniques or materials, a *de haut en bas* attitude from the trainer, etc.) or the session top-heavy with too much information presented in a confused way. One danger that exists in this situation is the possibility of trainee humiliation; another involves the declining returns the higher the ratio of trainee to trainer (naturally a big temptation should income correspond to the number of paying learners).

Generally, training will start out by presenting the main concepts first; then as this knowledge builds, practice will follow that concerns the skills that were explained in theory and that makes the trainee competent in skills application. Instruction may be a one-session training event or a much longer series of classroom-based teaching with workshop visits. The instructor may just be a source of expertise, reaming off words of advice and giving some direct technical instruction on a piece of equipment; or he may integrate this role into those of mentor and coach of self-learning adults, moral guide and then career advisor to "graduates", among other activities.

If he is to give an effective class and fire up the interest of his learners, it would be interesting for the trainer to see which training methods are regarded as most enjoyed by trainees (in the field of mining, for example, the four preferred methods are "Hands-on practice in classroom", "Practice at Worksite", "Simulation or drill" and "Watching videos" (Peters (2002: 11), Figueiroa *et al*. (2012)). However, even an overworked MC can then measure his success as being the difference in competence between those who are untrained and those who have finished their training: the knowledge and skills gained, the quality of worksite implementation, and the impact on the enterprise.

Here there is also an important question of the language of instruction. The low-skilled above all will require either communication in their own language or help in better understanding another one, if this is really necessary. A local MC, conversant in the local language, would not create difficulties in this regard. A trainer may give instruction in the native language of the locals but published material (e.g., manuals, brochures and the like) may be in French or English – even the Web is not so multi-lingual. Some larger enterprises include language instruction within their pre-apprenticeship commitments (e.g., the Nemangkawi Mining Institute in Indonesia).

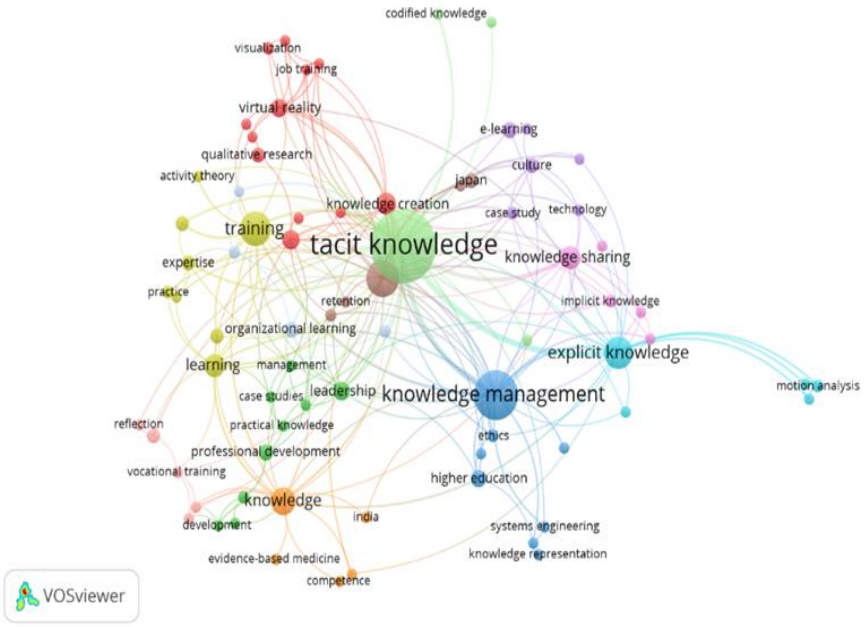
It might be worthwhile giving the trainer some orientation concerning published or other materials not in either his or his trainees' first language. Otherwise, quite possibly the government could be notified of the necessity of translations of key material, or the work could be done by a sectoral group (chamber of commerce or union). A company with sufficient resources could also do this but this is likely to be beyond the capacity of all but the most dynamic of the wealthy firms.

What are the characteristics of tacit training knowledge?

Tacit training is based on knowledge that you do not get from teaching, books, etc., but from personal experience, for example, when working in a particular organization. Then through observation, feedback from a teacher, repetition, practice, and (in many cases) relatively informal coaching in a well-planned or even improvised "programme", one learns the skills and knowledge to work competently. There is a lot of discussion in the literature about tacit knowledge, but not so much about tacit training, although the subject comes out under other categories (e.g., on-the-job training). 597 documents were found in our bibliometric search.

In this literature, there is a number of thematic clusters (as shown in Fig. 5.1): a connection was found between knowledge sharing, implicit knowledge, case study, culture, and e-learning. Knowledge management is an important topic within the general theme. Leadership, practical knowledge, and professional development were also linked topics. The interesting thing is that certain other issues, which are important in this current research, are not so well represented in the publications: professional training, competence, reflection, experience, practice, job training and codified knowledge.

Fig. 5.1. Tacit knowledge and training: results from 597 documents



A good starting question concerning tacit knowledge involves the informal means of transmission through which it is sent and how to facilitate this and make it more effective. In addition, the danger here is that by doing this one may be belittling its effectiveness and richness. The subject of interpersonal understanding and respect may also be significant: if the person who embodies this knowledge is a semi-literate master-craftsman and the organisation he is contracted to work for as a trainer is a large firm staffed by

training managers who do not comprehend the information and techniques that their new instructor possesses, then the full benefit of his experience and technical knowledge might not be fully used (Corbel *et al*., 2014). Cowan *et al*. (1999) stop short of elaborating on the possible limitations of codification of knowledge in the training scenario. However, it would be no surprise to discover that the tacit knowledge, as embodied in a master-craftsman for example, has been routinised and codified in such a way that information is missing or incorrectly configured, and a less than ideal or even incompatible type of training methodology has been included, not to mention that a large measure of the success of applying tacit knowledge results from the non-codifiable criteria and instincts of the instructor-craftsman himself.

There exists the notion that there always remains a part of training knowledge that is left tacit (in this study, unless qualified by the context, knowledge is taken to embrace both tacit and codified varieties), that perhaps cannot (or should not) be codified, supporting as it does the actual competency of the skills development act (Malerba and Orsenigo (2000: 294), Lahiri and Narayanan (2013: 1042-1046)). Again, it should be kept in mind that competency in this study is understood to mean that part of knowledge that links diverse parts of tacit and codified knowledge together. This is not to deny the eminently communicable, consensual, authoritative, uniform and adaptable advantages of codification, as well as its cost benefits and social advantages. There is another point to be made about training knowledge: when it is simple, it could be expected to diffuse relatively easily, whereas if it is complex (either in itself or because of the way it has been codified), it might disperse less generally, instead diffusing along certain routes such as social or professional networks (Sorenson *et al*. (2004), Fai *et al*. (2018)).

Of course, tacit knowledge persists in many places and sectors. There are a number of obvious reasons for this: (i) it is too expensive to codify, (ii) its codification would have limited benefits, (iii) there exists too much tacit

knowledge to codify, particularly in the context of limited capability to undertake such a task, (iv) there is incomplete, premature or inappropriate codified training knowledge that makes the tacit version preferable, and (v) it might be useful in terms of flexibility of course design and delivery. Without simplifying real-life situations excessively, it is often the case that a relatively high level of tacit skills knowledge is useful and appropriate at the more basic levels, and codification assumes greater importance as the tasks and information addressed become more complicated and organisationally more important.

It is arguably often the case that the prevalence of tacit knowledge decreases the further one goes up the skills ladder. Similarly, the more complicated the skills being addressed, or the more it has to do with modern technology and techniques, the more important the role of codified knowledge. The prevalence of one over the other will also affect such matters as the trainer selected, the equipment to be used, the choice of appropriate methodologies of instruction, the type and implementation of assessment (whether demonstrative/practical or written/theoretical, etc.), and the options as to work placement and training continuity.

Tacit knowledge can be understood by and transmitted among members of a particular epistemic community. As such, if the language, customs, techniques, tools, etc. are not easily understood, it could be exclusionary (Breschi and Lissoni (2001: 989), Acs and Sanders (2012)). And though physical proximity is not necessarily a requirement or facet of epistemic understanding, its existence could be very helpful in transmitting tacit knowledge and reducing exclusion: e.g., demonstrations of technique, continuous interaction to remedy errors, etc.

In the sense that a trainee has been instructed through techniques and verbal information that are tacit, and that these now exist in him and not stored in codified form in the firm, means that his departure could be a double loss: that of a skilled employee and also a transmitter of skills knowledge (to

colleagues, apprentices, etc.). However, his arrival at another firm could produce some benefit – a positive externality – for the latter, for the same reasons. One wonders whether the benefit for the second enterprise is equal to the loss suffered by the first, as the knowledge and skills embodied by the new recruit could be relatively specific to the first firm. However, the deficiency and remedies required might be small matters if the two firms have similar focuses, or even if the knowledge and skills act as a good base for upskilling in the new firm or as an extension of its skills pool. The localised mobility of personnel can produce advantageous spillovers; where it is a definite loss is when it involves the departure of the worker from the locality itself, a geographical "brain drain".

It might be the case that there occurs a progression from tacit knowledge to a mixed tacit/codified creation: this process embraces a modelling phase that converts (in this case) demonstrated tasks into ideas, which in turn are converted through a messaging phase into understandable language. In this way, the formalisation of skills development can evolve from basic to advanced training codification, with the basic variety often endowed with a strong tacit element and the advanced variety often with a strongly codified character. This subject has been addressed by some authors (e.g., by Klagge and Peter, 2012) but it merits greater appraisal.

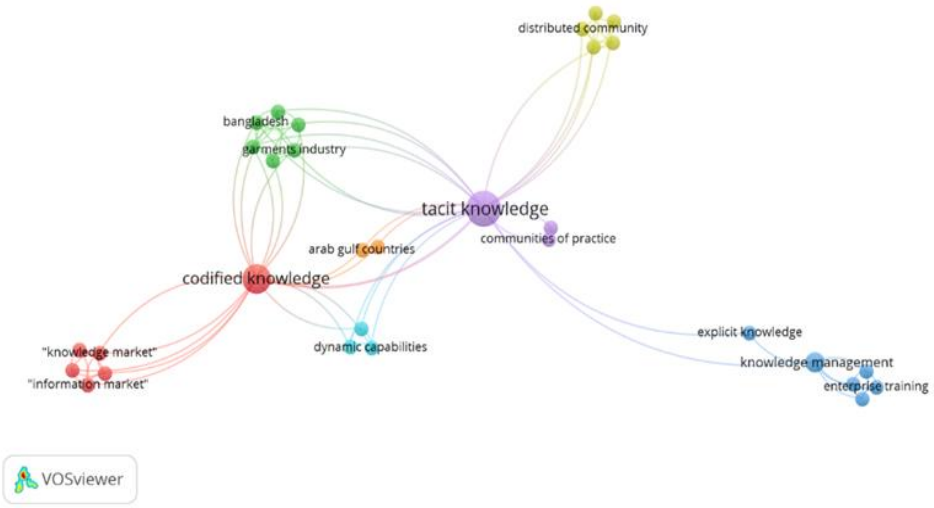
What are the characteristics of codified training knowledge?

While it is true that not all knowledge that individuals possess is captured and encoded, or used in a training environment, encoded knowledge and training are obviously very useful. Codified knowledge that is tested and practical can be stored and reused by others; geographically distant operations can take advantage of it in a timely and profitable manner. It involves information that is objective and external to the specific user, which is focused on the development and application of skills. There are other advantages: for example, codified knowledge can be combined, classified or

synthesized to become explicit new knowledge. One weakness could be that while it provides beginners with the basics, it does not provide them with enough skills to apply the knowledge in action. Even real coded knowledge repositories can be created if the benefits are recognised and the training project is well organised, and of course this project can include a wide range of other tools and even e-learning applications and processes.

Codified knowledge and training are inevitably related to the tacit variety in many research publications. We feel that, like the conundrum of unspoken training, codified training deserves much more study. In the literature, as demonstrated in fig. 5.2, explicit knowledge, knowledge management and business training have been considered together with the knowledge/information market and dynamic capacities, and to a lesser extent with communities of practice.

Fig. 5.2. Coded knowledge and training: 77 document results



In terms of training codification, this will take place according to a clear recognition of the benefits involved, the possible costs, and the capacity to achieve it through a method that can be applied afterwards in an efficient and beneficial way. Training codification involves the creation of messages,

models and infrastructure. Codification of course is greatly related to the people involved (e.g., general educational or experiential level of participants), and the knowledge and abilities of the programme designer, instructors and assessors, as well as facilities, equipment and organisational structure in place. The training system itself, and the information structure that exists within the firm or its network, will affect what the extent of codification will be and how it will be stored, applied, expanded and updated. Furthering this point, it could be contended that it has creative repercussions: the codification of training, insomuch as it involves the capturing of expertise in a replicable form, is as a consequence a "creator of expertise".

The accumulation of training elements (especially the expansion of a codified pool of training knowledge and tools) should hopefully benefit the firm and have repercussions outside it. As such it is part of the cumulative expansion of the codified knowledge-base that affects economic growth (as expounded by authors such as Abramowitz and David (1996) and Wheelahan (2012)). In practice what weakens the efficacy of codification is the inadequate conceptualisation of information and the fact that, faced with the same information, two different agents will understand and use what they have learnt in different ways, depending on their capability to fully comprehend the information and their talent and commitment to using it. Though this has been somewhat addressed by Lahiri and Narayanan (2013), this topic is worth investigating further. It should be kept in mind that, though elements of the training system may be codified, access to the knowledge itself may be restricted, incomplete or misinterpreted. The fact that a proportion of the training process is codified does not automatically mean that it has useful value, or indeed that it has been competently codified in the first place, is appropriate to apparently similar contexts, or is based on successful best practices (Zuckerman, 2012). On the other hand, if it is relatively well-codified and communicated properly and undiminished to the public, it can be of great benefit (and even a sizeable public good).

The following are some of the advantages of the codification of training:

(i) Uniformity of quality
(ii) Assessability
(iii) Accessibility
(iv) Communicability
(v) Clarity of content, activities and objectives
(vi) Storeability (and therefore also non-loseability)
(vii) Non-dependendability on specific trainers
(viii) Possible mutual compatibility and enhanceability with tacit training knowledge
(ix) "Macro" social benefits
(x) Identifiability of alternatives
(xi) Very importantly, cost reduction (on this point, see Sheikheldin, 2018)

The codification of training may mean high costs at the beginning (as well as teething problems involving participants, administrative structure, firm-wide collaboration, etc.), but it should permit training operations to be carried out at low marginal costs, as well as fulfilling objectives of easy availability, understandability and appropriateness of method, content, assessment procedures and related tasks. The very fact that, once developed and implemented, it is reusable, adaptable and improvable, makes it a sound investment. However, marginal benefits and marginal costs of offering training and indeed of codifying it, assume that a desire and a capability exist to carry this out. It might just as well be over- or underemphasised, or even not emphasised at all.

On the issue of investment in codification of training, the firm that chooses to undertake the model-building, language-construction and message-writing (Cowan and Foray (1997: 620), Hage *et al*. (2013)) that are necessary to bring this about, as such pay for the fixed costs. By doing this, they take on the initial generic costs of developing all or part of the training

system, which in turn means that other firms and institutes can take advantage of the accessible training knowledge environment – comprising elements that can be transferred, copied or purchased – and must only meet variable charges. In summary, codification of training may mean high costs at the beginning for the codifying agent but later it should permit training operations to be carried out at low marginal costs; once developed and implemented, it is reusable, adaptable and improvable. Many would say that government-backed bodies should take on this responsibility of creating and stabilising a knowledge environment but how well it has done this in the past is open to question.

There is no doubt a cost-reduction advantage to emulating the developed and tested skills development system of a firm or institute engaging in training activities. Furthermore, it has been persuasively argued that reasonable well-managed firms tend to mimic those enterprises they regard as successful (Strang and Macy (2001), Zuckerman (2012)), and the same would arguably be the case in the training field. However, there are a number of issues involved. An obvious one concerns the communication challenge, which relates to a number of related questions: how much is made known to the outside world concerning the workings and content of the system, as well as its strengths and pitfalls; in addition, how hard is the emulating firm looking (it might just be plumping for the most accessible option) and is it clear about its criteria for selection? The second issue is a capability challenge: how well can the second firm emulate in terms of its internal capability limits? Here we are discussing an external, as opposed to an internal, search for training options based perhaps more on starry training successes (Gaba and Terlaak, 2013), rather than sufficiently on specific internal problems and capabilities (the general tendency is discussed in Levinthal, 2011) and the failures that go unreported in the knowledge that is made public (Haunschild and Sullivan, 2002).

There are of course many sources of emulation based on real-life issues such as similarity of business activity, geographical proximity, legislative and corporate obligation, and herd behaviour (this last is well discussed by Swedlow (2011) and Ali and Kartik (2012)). Skills development innovators and leaders might be found among competitors, industry leaders, corporate contacts, dominant local firms; from inside and outside the sector; among public and private providers, trade associations, and professional, vocational and qualifications institutes. The list could go on.

The perspective of a firm could be focused outwards if the firm has little experience or capability in capacity building or if it has been a failure in its attempts to develop this capability. Needless to say, internal failures are highly influential whereas information about external ones is easier to hide or minimise (Strang and Still, 2004: 319). On the contrary, its focus might be more internal if its own training system and the people involved with it display enough competence and assurance, and if its training experiments (small-scale and immature though they still may be) have been successful. In addition, there are a whole host of criteria concerning why and to what degree certain skills development capabilities are chosen: trainee profile (e.g., technician or administrative, basic or advanced level), product or process focus, benchmarking accuracy, strategic importance, funding restrictions, internal or external provision capabilities, complex or simple, relatively certain or uncertain (extending the characteristics discussed in Strang, 2010).

Training codification means that people do not have to be released from what might be essential and highly profitable productive responsibilities to work as trainers within the firm itself, in other companies or in training providers. This is because the content, training methodology and assessment guidelines can be transferred by written, electronic, audio-visual or similar means, not merely embodied in a particular person or group. It also means that training knowledge in codified form can be seen as a

commodity (and therefore somewhat controllable and perhaps saleable), free of its *embeddedness* in people but at the same time capable of being embedded in those who wish to be either trainers or trainees, in a situation of organisational structure and facilities that allow them to implement the skills development activity. It should be kept in mind, however, that some training codification is not so easily transferred, especially if it is complicated and not easily understood by instructors or trainees, requires specialised knowledge among trainers, or involves expensive or difficult-to-access equipment, tools or installations.

The selection of the right trainer is highly important, sometimes for his role as a bridge between informal and formal capacity building. For example, if the trainer embodies much of the tacit knowledge essential to fill the gaps in codified knowledge, implement it in practice, and adapt it to local or sectoral conditions, then his skills knowledge and pedagogical capability are a pivotal factor (Grollman and Rauner, 2007). At the same time, a competent trainer can be a knowledge translator, in the sense that relatively complicated codified or even tacit information or methodologies can be explained by him in a simplified, near-tacit way for the illiterate and unskilled.

Training codification can be socially beneficial if the number of participating agents is large; if there exists the possibility of recombination, re-usage or cumulativeness (Zhu and He (2014) and Wheelahan and Moodie (2016) talk about this theme in terms of innovation models); if a loss of expertise is avoided by codification; if it delineates ways of achieving such goals as efficiency, innovation and high standards; and if they permit structural or process changes that may affect not just a single firm but a whole local cluster.

New innovations in operational processes and technology – whether they are tacit or codified prior, during or subsequent to evaluation and implementation – may make the training related to the old processes and

technologies inefficient and even obsolete. The ability of a firm to adopt/imitate innovations is thus also dependent on its ability to adapt its training system. There could be a relatively elevated cost if this involves external sources (which indeed may be the sole choice) and hence it is important for a firm to know what its options are, how much investment is required ("pecuniary knowledge externalities," as Antonelli terms it (2008)), and how it can be appropriately implemented in a timely manner.

If innovation has been called a key element in the survival of firms (Buddelmeyer *et al*., 2010), how important is skills development as well in terms of the central role it plays in the process and application of innovation? Cefis and Marsili (2005: 1168) argue that firms that have introduced process innovations show a "25% increase in survival time" when compared with others which were not innovative, a view echoed by Figueiredo and Silverman (2012). It could be argued that it is an indivisible part of business longevity and progress, for, without it, new technologies and processes cannot be introduced or are not used to their full potential, optimum working levels are not reached, competitive pressures from other more skills-capable firms are overwhelming, and the betterment of processes and products is not supported by a corresponding level of talent.

If training codification is too localised (i.e., too in-company), then the objective of such goods as best-practice transfer might be stalled or slowed down by compatibility costs and effort associated with recodification. Two mutually incompatible codifications, involving the same subject or activity, is a waste of resources and an obstacle to mutually beneficial cooperation, especially at the local or sectoral levels. In this case (as in others), this is where the guiding hand of a supra-organisation, involving perhaps a qualifications framework and mechanisms to create equivalences, could be useful.

There are other negative issues associated with codification. For example, an excess of training codification (as with a rigidity of rules and

performance criteria) might militate against such benefits as flexibility to the changing environment (which embraces trainee profile, product, processes, market, budget, etc.), openness to tacit input, pro-activeness and innovation. Likewise, the period during which training operations are being established is relatively costly, while benefits arise usually when operational stability has been achieved (and capacity building can play a central part in this stability), with the result that the latter situation may encourage inertia. The skills themselves might not be so capable of codification, in which case alternatives are to maintain the best skills development based on tacit knowledge and its associated techniques, or bring in skilled people or purchase another firm with the required skilled employees.

The codification of training is usually part of the system that has formalised and standardised such matters as job description, contracts, performance evaluations and expectations, application procedures and specifically candidate selection, HR information systems, and affirmative action plans, among other factors. If this is the case, it is one element in a complex and mutually responsive structure that is profoundly integrated into the organisational workings and evolution of the firm. Though ideally the training system has to be kept somewhat apart from what it is assessing and improving, it is the practice in many firms to evolve their capacity-building organisation concurrently in an interdependent dynamic, for this and other reasons.

Up to now, we have focused our attention mostly on organised training inputs. But there may be a great deal of skills progress accrued through incremental developments in working techniques and technologies in an everyday, on-the-job scenario. This is training of a type but not necessarily formally assessed or scheduled, not part of a consciously planned path, often not codified. The worker may for instance have a good skills competence level achieved through previous training and work experience, be in a position of relative working autonomy and capable of self-directed

functions as circumstances permit (Rauner *et al*., 2013). Through the actual work he performs and equipment he uses, he may learn things that go beyond what he has experienced or been trained for before. This is learning by doing.

Conclusion

In summary, the value of training by tacit means or through codification can be measured through the diffusion and appropriateness of knowledge and skills, the number and quality of "successful" trainees (however this is calibrated), and the repercussions for good or ill that accrue subsequently.

Simplifying this a little for reasons of clarity and brevity, this depends on the skills ability and learning capacity of the trainee initially and then, consequently, on his/her ability to employ the enhanced or new skills productively and to pass on this knowledge or expertise to others in a skills-domino effect, either as an exemplar colleague or perhaps as a fully-fledged mentor or trainer.

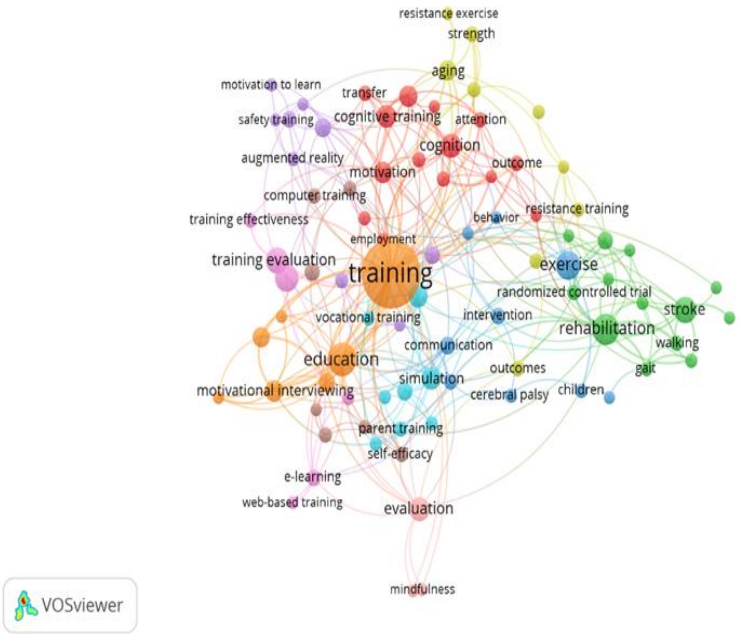
Again, depending on how well they have internalised the training, and how well they communicate what they have learned (either "consciously" as more or less clear performance instruction to others, or "unconsciously" as demonstration of work done), then there will be greater or lesser knock-on benefits. The important point perhaps in this context is that at least there should be some positive results diffused out within the firm and beyond.

Section 6

General Conclusions

In recent research, as revealed in our bibliometric analysis of articles published in respected journals, the topic of training has been associated with the evaluation and effectiveness of training, along with motivation, cognition, and reluctance to learn; similarly, the related topic of education is grouped with more specialised activities like motivational interviewing; the current strong interest in e-learning and web-based training is present; simulation, parental training and the concept of self-efficacy have also been objects of attention.

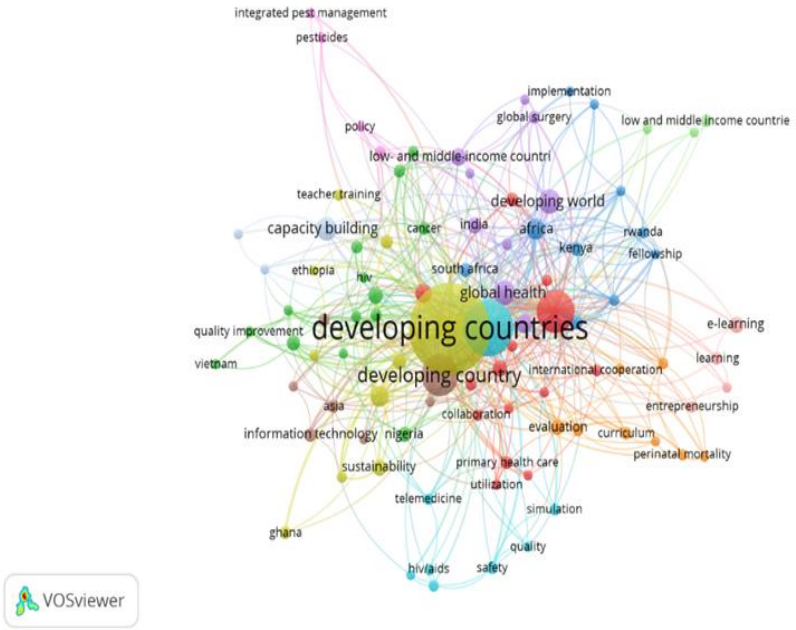
Fig. 6.1. Training results: 1,237 document results



More specifically, several developing countries are mentioned more often than others in the context of this general topic of training: low- and middle-income countries such as India and South Africa as well as Kenya, Rwanda, Ghana, Nigeria and Vietnam. The main areas of interest according to our bibliometric research in the published literature appear to be:

international cooperation and collaboration, sustainability, training policies, quality improvement, capacity building, teacher training, evaluation, information technology and entrepreneurship. Other concerns included here are global health and perinatal mortality, and even pesticide use. As you can see, the literature is diverse and vast.

Fig. 6.2. Developing countries and training: 16,790 results documents



Training is very important as a central component in individual self-esteem, staff morale, team-building, sense of democratic participation in the well-being of the enterprise, and so on. For the pre- and unemployed, it is a way to enter or return to the active workforce. In the case of those who are already employed, it is part of the conditions required for employee performance to be improved, the other conditions being organisational and work practices like regular performance appraisals, status and remuneration, information on and compliance with business plans and targets, and regular feedback, among others.

This study shows that training plays a central role in the stability of firms in terms of labour performance, skills enhancement and staff retention, in profitability and competitiveness, in local social development, and many

other factors. We have set out to answer certain enterprise-centred questions as these: does training have an essential complementary role to the firm's organisation and operational practices? And if so, what is the benefit of this? The question of training complementarity is a relatively recent and not-so-developed medium issue, confirmed by the comparatively low number (472) of documents identified in our bibliometric analysis. According to this activity, the most important topics are institutional complementarity, human capital, accreditation and virtual learning. Other issues – process, networks, diversity, classifying combination, deep learning and machine learning – appear in a few publications.

Fig. 6.3. Complementarity of training: 472 results of documents

There appears to be a complementarity between the organisational structures, procedures and routines of firms and the training that fits, supports and indeed extends them. The question then is, is there a clear organisational culture or set of employment practices that dictate what training should be done, by whom, for whom and when? This involves identifying which are the internal determinants of the training regime. The skills development undertaken will thus be contextualised and credible through its recognised derivative relationship with the business objectives as well as the work practices operating in the firm itself.

However, one effect of training is that, if it is not done well, it may adversely influence the different complementarities and interfaces that make up the general integrated working of the firm, thereby changing the structure of the overall knowledge stock of the firm and the part played by general and core competencies. This question attempts to go further than Malerba and Orsenigo (2000: 299) and Lahiri and Narayanan (2013) in analysing the part played by training in this context.

On the other hand, if the training system that the firm operates is reasonably consistent, transparent and uncomplicated, it can work in conjunction with other HR practices such as recruitment and job design in bringing about high working interdependence, a fair internal job market, reduced expectation of differential treatment (Miller (2009)) and an all-round disciplined cost-effective structure. All of this works in favour of the complementary integration and perceived value that nurtures human capital formation.

There are a number of very powerful internal reasons for a firm-level training system. The direction and emphases in the internal training system of the firm may change as decisions are made regarding the development and fortification of firm-level competencies confronting changes in technology (Henderson and Clark (1990), Ravisi (2012)), working practices, legislation, market conditions (Helfat and Winter, 2011), interfirm competition, current and potential personnel, the appearance of new training providers and knowledge (either general or sector-specific) (Almor *et al*. (2014), profit margins and budgeting, developments in economic and HR thinking concerning human capital formation, and the long-term survival of the firm as an efficient going concern.

One aspect of this question involves the idea that improved skills lead to locals being recruited and employees being retained rather than being replaced by more able substitutes; the latter possibly being expatriates whose employment would not really benefit locals, simply because they send their wages to their family in another region or country (Uberti, 2015). Another

aspect relates to the project to harmonise employees' abilities with general company developments and objectives to fill specific internal skills gaps and achieve improved outputs. Indeed, the employee might have this reinforced by a focus on performance, goals, supplier/customer profile and interdisciplinary problem-solving. Another reason has to do with the creation of teams in which each member has a relatively high minimum capability and a willingness to work with others of a like ability and propensity.

Lastly, training might be seen as a stop-gap activity, solving the problem of immediate skills shortage; thus, it could be relatively improvised, incomplete/non-thorough, and short-lived. One should recognise that this demand source could result in a series of actions, in the sense that recurring needs could bring about intermittent poorly organised training, a turbulent state of affairs that stands in contrast to a more stable, well-planned system. On the other hand, the emphasis could be on such drivers as continuous company development and improvement, as well as the long-term potential of employees; and therefore skills development operations in these circumstances, in order to be genuinely effective, would be well-considered, carefully managed and endowed with long-term commitment.

Of course, the bottom-line at the end of the day involves real company needs; otherwise, detached from these needs, the training operation could be superfluous. The fact that long-term training regimes come into being involves a vision and investment that is predicated on long-term commitment by the firm and employees, and attachment to the value of human capital formation (this advances the comments made by Iseke and Schneider (2012) concerning HR systems). In practice, the most obvious indicator of serious intent is the appointment of a training manager and, with more resources, of a training department or even semi-autonomous centre (Penuel and Shepard, 2016).

In conclusion, the development of training follows a pattern that can be divided into five steps:

Box 6.1. Five Steps to Develop Training (summary)

- (i) Identify clear goals/expected outcomes.
- (ii) Develop content that is based on goals.
- (iii) Designate appropriate delivery mechanisms: delivery through lectures/demonstrations/audiovisual media to individuals/partners/teams/group by trainers/mentors/miners in the classroom/planned OJT.
- (iv) Assessment to verify that specific learning goals have been reached.
- (v) Remediation in cases where the learning goal has not been reached but extra training will help the trainee to reach it.

In the course of this study we have outlined briefly what are the ways of initiating, developing, measuring and improving the intensity of each firm's training activity. We end with the following comments. The typical company has to address a range of *minimum training* issues involving immediate or deferrable needs, geographical and quality availabilities, and financial constraints; and each firm will give them a greater or lesser prioritisation depending on concrete internal, local, regional or even international circumstances. One item on the agenda will inevitably be spending on skills development and sources of financing. Another will be the number of people with a role in training, either full-time or part-time, from both inside and outside the firm (with a breakdown to analyse this in detail). Another topic is concerned with the number of courses, range of skills, levels covered, continuity arrangements, and other related matters. The age, efficiency and appropriateness of the training system are important, along with its potential for growth and adaption. The questions of the existence of a strategic plan as well as the place of capacity-building in overall firm strategy should be key.

It goes without saying that the existence of an in-company vocational and technical education organisation is also of great significance: its organisational structure, personnel, course-design methods, course content, assessments methodologies, and other internal inputs. A parallel to this are external inputs: existence and suitability of local regional stakeholders, their influence on and relationship to the firm and its training project. Again, an important issue are the expected and concrete effects of training: return on investment, employee and training staff retention, productivity increases (including mean labour productivity), average skills level, labour harmony, training reputation, changes in wage bill, net output, real value added per employee or per worked hour, total factor productivity (Dosi and Grazzi, 2010: 180-1), adaptability to technological progress and other types of innovation, discounting non-training factors such as equipment automation. Training spillover as an external effect also has its importance. In short, the number of trainees, their initial and current levels, number of graduates from training programmes, percentage still in the firm, along with continuous learning support and quality feedback, are central to the whole training experiment. One can also add to this subject recruits from outside with their own skills level and needs that have to be catered for.

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Sitios Importantes (lista selecta)

American Petroleum Institute: www.api.org
ASTD Benchmarking Forum: www.astd.org
Botswana Training Authority: www.bota.org.bw
COGENT (UK skills council): www.cogent-ssc.com
CIPD (the Chartered Institute of Personnel and Development, UK): www.cipd.co.uk
Engineering and Technology: www.abet.org, www, www.ncees.org, etc.
InterAcademy Council: Reports at www.interacademycouncil.net.
Inter-American Center for Knowledge Development in Vocational Training: www.cinterfor.org.uy
International Labour Organisation: www.ilo.org
MBAs: www.businessweek.com/bschools, etc.
Mbendi (mining information): www.mbendi.co.za.
Partnership for Higher Education in Africa: www.foundation-partnership.org
UNESCO: www.unesco.org
Statistical information from UNESCO: www.uis.unesco.org
West African Examinations Board: www.waecnigeria.org
World Bank Development Data: www.devdata.worldbank.org
World Education News and reviews: www.wes.org
World Factbook: www.cia.gov

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1925-2025
Lectura No. 90
100 ejemplares
Junio, 2025
México